CLAIMS

1. A method of installing a double ended distributed sensing optical fiber assembly within a guide conduit, the method comprising:

- providing a nose section, which interconnects the proximal ends of two sections of distributed sensing fiber optical cable such that light transmitted along the length of one section of fiber optical cable is transmitted via the nose section into the other section of fiber optical cable;
- inserting the nose section into the guide conduit such that the nose section moves through the guide conduit ahead of said two sections of distributed sensing fiber optical cable that are interconnected thereby;
- connecting the distal ends of the sections of distributed sensing fiber optical cable to a light transmission and receiving unit; and
- wherein the nose section has an outer width (W) which is less than 1 cm.

2. The method of claim 1, wherein the nose section has an outer width W which is less than 5 mm and the guide conduit has an internal width which is less than 10 mm.

3. The method of claim 1, wherein the nose section and two sections of distributed sensing fiber optical cable interconnected thereby are formed from a single fiber optical cable, which is bent into a U-shaped configuration in the region of the nose section and the fiber optical cable is stretched in said region such that the fiber optical cable has a smaller width in the region

of the nose section than in most other parts of the fiber optical cable.

4. The method of claim 3, wherein the fiber optical cable is heated when it is stretched and the bent section of stretched fiber optical cable is embedded in a nose-shaped body of material having a lower light reflection index than the stretched fiber optical cable embedded therein.

5. The method of claim 4, wherein said nose shaped body has a substantially cylindrical shape and an outer diameter less than 3 mm.

6. The method of claim 1 or 2, wherein the two sections of distributed sensing fiber optical cable are interconnected by a nose section which comprises a light reflecting element, such as a mirror, which is configured to transmit light emitted from a proximal end of one section of distributed sensing fiber optical cable into a proximal end of the other section of distributed sensing fiber optical cable.

7. The method of any preceding claim, wherein the light transmitting and receiving unit is configured to transmit light pulses or pulsed and continuous waves alternatingly or simultaneously into each distal end of each of said two sections of distributed sensing fiber optical cable and to acquire distributed sensing data from light backscattered from different points along the length of the two sections of fiber optical cable to the distal end into which the light pulses are transmitted.

8. The method of claim 7, wherein the distributed sensing fiber optical assembly is configured as a distributed temperature and/or distributed pressure sensor assembly, and wherein each section of distributed sensing fiber optical cable passes through a reference

region in which the fiber optical cable is exposed to a known temperature and/or hydraulic pressure.

9. The method of claim 8, wherein said reference region is formed by a chamber in which the temperature and pressure are monitored, in which chamber a selected length of each section of distributed sensing optical fiber is coiled.

10. The method of claim 1, wherein the nose section and at least a substantial part of the distributed sensing fiber optical cables interconnected thereby are inserted into the guide conduit by pumping a fluid from one end towards another end of the guide conduit.

11. The method of claim 1, wherein the guide conduit is installed within or in the vicinity of an elongate fluid transfer flowline.

12. The method of claim 11, wherein the fluid transfer flowline is an underground inflow region of an oil and/or gas production well.

13. The method of claim 12, wherein the temperature and/or pressure of fluids flowing through at least part of an inflow region of an oil and/or gas production well are monitored by a distributed sensing fiber optical assembly and the method is used to monitor and/or control the production of oil and/or gas.

14. The method of claim 1, wherein at least substantial parts of the two sections of the double ended fiber optical cable are arranged side by side in a protective stainless steel tube, which preferably has an outer diameter (OD) from 1 to 3 mm, which tube is connected to a protective end cap in which the nose section is arranged and which tube is inserted into the guide conduit.

15. The method of claim 14, wherein a plurality of fiber optical sensing assemblies extend side by side through the protective stainless tube, which sensing assemblies monitor different physical parameters such as pressure, temperature and/or acoustic data and which a coupled to a series of flow, pressure, temperature, acoustic and/or seismic data monitoring assemblies.

16. The method of claim 1, wherein at least substantial parts of the two sections of the double ended fiber optical cable are arranged side by side in a jacketed flexible protective tube, which is provided with a moulded end cap in which the nose section is arranged.

17. The method of claim 1, wherein the guide conduit has a substantially straight shape and is at a lower end thereof equipped with a check valve, such that when the double ended fiber and nose section are pumped into the guide conduit the pump fluid is discharged from the guide conduit through the check valve.

18. The method of claim 1, wherein the optical fiber assembly is inserted into the guide conduit which extends into a subsea well by means of a remotely operated subsea pod, which is removably mounted on a subsea wellhead.

19. The method of claim 14, wherein the protective stainless steel tube is arranged within a larger OD stainless steel tube, such as a ¼" (6 mm OD) control.

20. The method of claim 1, wherein the guide tube is formed by the casing of an oil and/or gas production well and the double ended distributed sensing optical fiber assembly is strapped to the production tubing of the oil and/org as production well, or otherwise inserted into the well